



## Oceaneering International, Inc.

# Remote Intervention Tower Elimination System

### Technology Need:

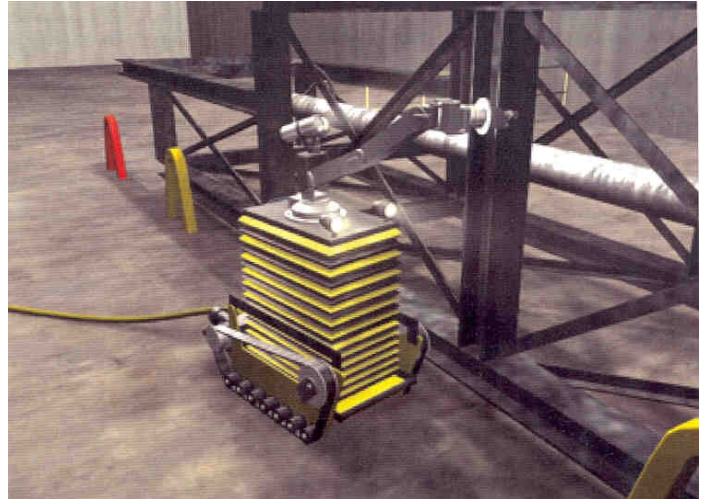
The United States Department of Energy's Hanford site, has a number of well-defined needs for robust, remote material handling systems for the disposal of significant waste streams critical to the Hanford mission. Enforceable Consent Agreement milestones are tied to these waste streams, and continued long-term storage is not an option.

The first waste stream components to be tackled under this program are two (2) PUREX towers located on the canyon deck of T-plant. Size reduction of the PUREX towers will be carried out on the canyon deck at T-plant. It is very likely that most future size reduction of long-length and oversized RH-TRU waste inventory will also be conducted at the same location. Technologies are needed for the remote handling and size reduction of this waste inventory at Hanford so that they will be in compliance with the Consent Agreement.

### Technology Description:

Oceaneering International, Inc. has been awarded a contract to develop a remotely operated system capable of cutting and size reduction of waste inventory similar to that of the Hanford site. The proposed system is called the *Remote Intervention Tower Elimination System (RITES)* and is operated by placing an electric powered, remotely operated, telerobotic, tracked vehicle system in the canyon utilizing the site's existing overhead crane. The RITES system utilizes an assembly of commercially available components to produce a remotely operated size reduction system. Emphasis is placed on flexibility and ease of operation.

Central to the system is the remotely operated vehicle (ROV) work platform that will maneuver easily in the canyon and employ its plasma arc cutting torch to size reduce the tower structures. The ROV is an electric



powered tracked vehicle which is powered and controlled by an attached umbilical. The ROV has two powerful electric motors which are coupled to gearboxes that produce 1,000 inch pounds of torque each. The motors can be individually controlled to power and steer the vehicle's dual track system. The vehicle is compact ( $\approx 24''\text{W} \times 46''\text{L} \times 38''\text{H}$ ) and capable of operating and maneuvering in confined spaces.

The vehicle is equipped with an extendable tool platform that can reach an overall height off the floor of approximately 10 feet. It has a fixed position, pan and tilt color camera system that can pan  $360^\circ$  and tilt  $180^\circ$ . The camera system includes directional spot lights and has zoom capability. Mounted on the platform is a plasma arc-cutting torch with a remotely controlled positioning system. Oceaneering believes that plasma arc is the most efficient method of cutting the irregularly shaped components of the towers. Should this approach be unacceptable, they have a variety of remotely operated mechanical cutting tools that can be readily mounted to the vehicle platform.

To eliminate the spread of airborne contamination during the cutting process, a hood can be lowered by

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the overhead crane over the tower section to be cut. The hood will have an air intake that can be connected to the building HEPA filtration system. The filtration system can be fitted for a spark-arresting device and discharge nozzles for a fire suppressant can be incorporated into the hood.

The system is operable from outside the canyon by an operator controlling the vehicle remotely, through an attached power and control tether. The vehicle will be maneuvered along side the tower and will position its cutting torch to size reduce the tower. The system will provide electromagnets that will be used on the existing overhead crane and will be operated by the remote pendant controller to secure the cut pieces. Once the cut is complete, the piece will be transported to and placed directly into the waste container.

### Benefits:

- ▶ Remote operation minimizes or eliminates direct human intervention in the work area during operation
- ▶ System is simple to deploy/operate and does not require a complex interface with a computer system
- ▶ Vehicle can be easily outfitted with a variety of tools, manipulators and vacuum cleaning systems
- ▶ Material can be readily cut, characterized, segregated, and packaged remotely
- ▶ No secondary waste will be generated during the operation of the system
- ▶ Robotic vehicle will fit into one standard waste box for storage and/or transport

### Status and Accomplishments:

A contract for this project was awarded in June 2001. In Phase I of this contract, Oceaneering completed the mobile vehicle and plasma torch cutting demonstration at the PUREX T-L2 and T-J4 towers cold mockup facility at the Hanford Site during the Month of August 2001. The system demonstration confirmed that size reduction can be accomplished remotely. However,

the system seemed to have some difficulty in maintaining a correct stand-off distance, which in turn affected the ability to keep the torch lit. The Phase II option for a “hot demonstration” was not awarded and the project closed on January 15, 2002.

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### Online Resources:

Office of Science and Technology, Technology Management System (TMS), Tech ID # 3169  
<http://ost.em.doe.gov/tms>

The National Energy Technology Laboratory Internet address is <http://www.netl.doe.gov>

For additional information, please visit the Oceaneering International Inc.’s Internet address at <http://www.oceaneering.com/>